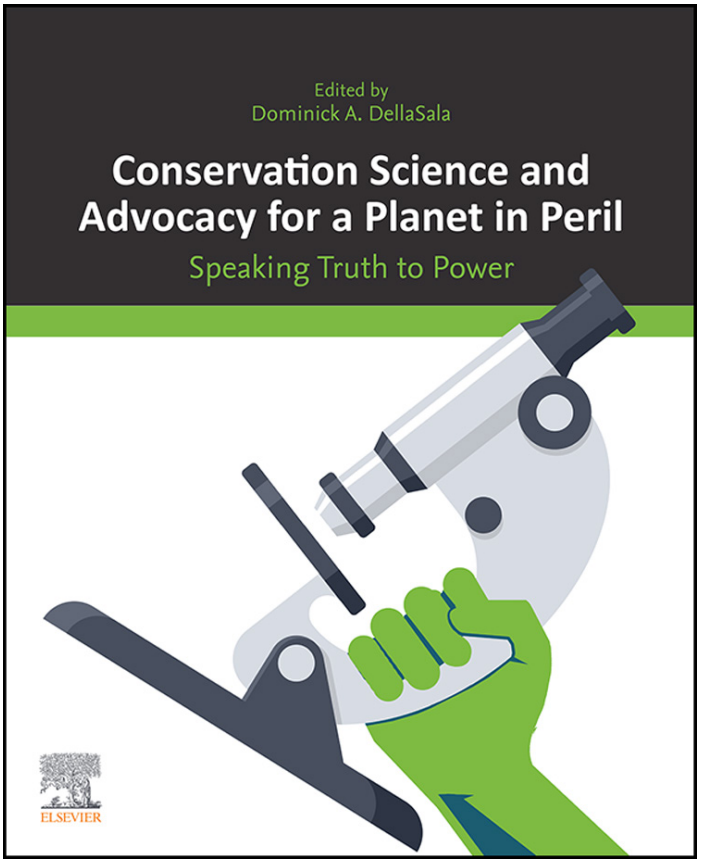

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When scientists are attacked: strategies for dissident scientists and whistleblowers

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Contrarians and dissidents

It may surprise you to learn that Albert Einstein and Carl Sagan were subjected to years of vehement criticism and smear campaigns against them in response to the theories of relativity and nuclear winter (Oreskes and Conway, 2010; Wazeck, 2013). Science is often portrayed as the work of objective, rational people who dispassionately examine evidence to reach conclusions (also see, Chapter 1, The Nuts and Bolts of Science-Based Advocacy). In fact, science is a practical method to gain knowledge—one that acknowledges all scientists are humans with inescapable subjective biases, agendas, social obligations, political beliefs, and prejudices, but the scientific method works to minimize subjectivity and helps us discover objective truth by using empirical data to dismiss false claims (Grinnell, 2009). Like democracy, science requires free speech and free press to function properly so the marketplace of ideas can consider any new, even shocking idea, and then empirically judge its veracity (Bambauer, 2017). In practice, the marketplace of ideas is severely skewed in favor of entrenched power structures and status quo ideologies (Ingber, 1984), but dissidents can change the world.

Einstein's theory of special relativity caused an uproar, and the scientific community mobilized to publish a collection of essays titled "One Hundred Authors Against Einstein." Einstein supposedly retorted: "If I were wrong, one would have been enough," because if his theory were wrong, any one person could collect and publish data that would disprove all or part of the theory. That so many people weighed in against Einstein's new theory shows the power of

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public relations in the marketplace of ideas. In Einstein's case his theory prevailed against the public relations campaign that was waged against it. In the case of climate change, where near-total scientific consensus has existed for decades, a public relations campaign by the fossil fuels industry successfully misinformed a huge portion of the public and stopped policies to reduce greenhouse gases at the time such efforts would have been most effective. We are providing information in this chapter to help readers understand the institutional, political, and psychological barriers to honest open scientific discussion, what to expect when a scientist becomes a contrarian or dissident, and how to successfully advance and promote your dissident ideas to facilitate conservation in the coming decades.

The genesis and evolution of scientific understanding on a topic often follow a standard life cycle (Fleck, 1935; Kuhn, 1970). Early observations and their interpretations on a topic form a body of evidence and theory that become the foundation of a worldview or dominant paradigm regarding the topic. The dominant paradigm shapes the discourse, research, and policy related to the topic, and is guarded by gatekeepers in the thought collective of people from academia, industry, and government that have a vested interest in the paradigm. Inevitably, anomalies accumulate showing failures or omissions in the paradigm, initiating one or more of three possible responses: the existing paradigm can be corrected; a revolution can occur that replaces the old paradigm with a new one (Kuhn, 1970); or the gatekeepers might ignore or suppress the anomalies (Martin, 1999a).

There is a long history of intellectual gatekeeping of ideas in science going back at least to Galileo. Whenever a power structure is threatened by novel ideas, we can expect the powerful to attempt to suppress those ideas. The modern synergies among government, industry, academia, and agency scientists comprise the current power structure in science. The dominant players are governments and large corporations that provide most of the funding for science, the community of professional scientists themselves, and the scientific elites who control funding decisions. Martin (1998) suggests that it is useful to think of the scientific community, and any associated thought collective defending a dominant paradigm, in terms of interests such as money, power, status, privilege, or other advantages (Barnes, 1977). Because interests are powerful shapers of people's world views and self-identities, interests exert strong pressure on the direction of research and shape the responses by gatekeepers to those who challenge a dominant paradigm.

Scientists who challenge a dominant paradigm generally fall into two categories that differ by degree: contrarians or dissidents (Delborne, 2008).

Contrarian scientists practice agonistic engagement, which are conventional behaviors within the scientific community (e.g., publishing data or critical commentaries on others' papers). Contrarian disagreements are common when there is a lack of consensus within the relevant scientific community. Contrarian science goes

against dominant scientific paradigms by challenging accepted theories, introducing new methods or theories, or exposing inconsistencies in assumptions. Contrarians are potentially disruptive, but their work is usually conducted and deployed with at least some hope of convincing a mainstream scientific community of a new fact or approach (Delborne, 2008). Some contrarian scientists known as whistleblowers discover a fact that threatens a powerful industry such as genetically modified foods or pesticides (Ewen and Pusztai, 1999; Hayes et al., 2002), and efforts by the industry to discredit and suppress the whistleblower's findings may turn whistleblowers into dissidents.

Dissident scientists are characterized by scientific dissent, which refers to views that run contrary to widely accepted scientific theories, methods, or assumptions. Dissents challenge the knowledge claims of a dominant paradigm and call for some degree of reform in the relationships among science, politics, industry, and the public. Dissident behavior often provokes sanction by the scientific community, but credible dissident science combined with effective activism represents a powerful strategy to influence scientists, the public, government, and industry (Frickel, 2004), and to advance knowledge against countervailing political and economic forces.

Dissent and controversy have long been recognized to play crucial roles in the production of scientific advances (Kuhn, 1970). Dissenting views can correct false assumptions and ensure consideration of a wider range of theories, models, and explanations (Popper, 1963; Feyerabend, 1975; Longino, 2002; Kitcher, 2011). Dissident science explicitly acknowledges the politics within and around scientific controversy and advocates for new relationships among scientists, the public, interest groups, and academic institutions to reform the mechanisms involved in knowledge production. Dissident science represents practices that merge intellectual struggle with social and political action, incorporating a variety of strategies (Delborne, 2008). However, because contrarian and dissident scientists challenge the dominant paradigm, both can expect gatekeepers to practice impedance, suppression, co-opting, or defamation.

Scientists have an ethical obligation to stand up for their data and the greater truth embodied in empirical evidence. If one's science uncovers evidence of harm to human or nonhuman life due to actions, nonactions, products, or byproducts of an industry, the discovery must be disseminated to the perpetrators, the public, policymakers, and regulatory authorities so that the harm can be stopped or remedied (i.e., the Hippocratic Planetary Oath of DellaSala, Chapter 1, The Nuts and Bolts of Science-Based Advocacy). Whistleblowing or activist scientists are required to broadcast their claims such that the harm can be identified and ameliorated.

Brian Martin is a theoretical physicist turned historian of science who has spent decades studying scientific suppression and whistleblowing (Martin, 1981, 1999a,b; Campanario and Martin, 2004). He advises dissenters to understand the systems of power in which they operate and to carefully consider their tactical options (also

see Chapter 7, Scientific Integrity and Advocacy: Keeping the Government Honest). Dissenting scientists can expect gatekeeping behavior that ignores or suppresses their work from journal editors, peer reviewers, conference organizers, professional associations, and academic and government bureaucracies.

Martin also delineated strategies for dissident scientists including publish and publicize your dissenting data and interpretations wherever possible, expose attempts at suppression, and build a social movement (Martin, 1998). Delborne (2008) suggested the academic-industrial complex hinders the production and dissemination of dissenting science through traditional outlets such as scientific journals, so creating space for dissenting science is also an issue of intellectual and academic freedom. Transparency and public participation are also required in order to challenge or overcome entrenched paradigms within our institutions.

Contradictory or dissenting science will generally be rejected and ignored at first, but an effective public relations campaign and proactive popularization of the new idea can build a constituency that helps hasten, if not the adoption of the new idea, at least its consideration. Groups of scientists have constructed new political voices by organizing public interest science organizations (e.g., Union of Concerned Scientists: see Chapter 7, Scientific Integrity and Advocacy: Keeping the Government Honest) outside of traditional professional and academic societies (Moore, 1996; Frickel, 2004). Scientists, like other citizens, have political preferences and values that guide their actions, and bringing like-minded scientists together increases their political influence and reduces the risk of marginalization.

When gatekeeping scientists attack a challenge to the status quo made by contrarian or dissenting science, targets of criticism may include methodology, interpretation, application of theories or models, the credibility of the contrarian scientists, the appropriateness of the research question, the forum of the publication, or the policy or management implications of the findings. Gatekeepers acting as peer reviewers, journal editors, conference organizers, professional organization executives, or bureaucrats will employ diverse means to exclude the contrarian claim or dissident scientist from the zone of scientific legitimacy (see Chapter 1, The Nuts and Bolts of Science-Based Advocacy, regarding best available science biases). If the dissenting idea shows any promise of gaining popularity or threatens an industry, the gatekeepers will attempt to smear and discredit the proponents of that idea in ad hominem attacks. Contrarian, whistleblowing, or dissenting scientists can expect to have their life, career, and reputation assaulted by the gatekeepers of a paradigm. Marginalized scientists may, however, be able to expose unjust or repressive tactics used by more powerful forces.

The thought collective that defends a scientific paradigm can be purely intellectual such as geologists who refused to accept plate tectonics (Oreskes, 2001) or paleontologists who refused to believe dinosaurs could be anything other than

cold-blooded (Desmond, 1975). Intellectual collectives such as scientific societies can be very dangerous to open-minded advocates of new ideas. The "old boys club" of senior famous scientists whose identities and prestige are enmeshed with paradigmatic ideas can use scientific professional societies and their influence with employers and journals to crush careers and block publications while protecting and promoting ossified or corrupt concepts.

Thought collectives can also be linked to powerful industries such as tobacco, forestry, agriculture, petrochemicals, or weapons. In these cases, the dominant scientific paradigm may be either supported or opposed by the industry. In the cases of the tobacco and fossil fuels industries, the scientific community was largely united around the ideas that smoking causes cancer and burning fossil fuels causes climate change. In these cases, the industries funded a small group of scientific skeptics or useful stooges who inflated the uncertainty about these ideas, manufactured the illusion of doubt, and provided cover for the industries' damage to human health and welfare (Oreskes and Conway, 2010).

Challenging the dominant forestry paradigm: a case study

In the case of forestry, the dominant paradigm is defended by a powerful integrated complex composed of the timber industry, governments that subsidize and promote the industry while simultaneously being tasked with regulating it and protecting human and environmental health, universities that receive funding from the industry and government, and academic and government agency scientists employed or funded by the industry or by land management agencies that are financially involved in timber commodity production. Other industries that use or profit from timber (i.e., construction and transportation) are also indirectly involved in defending the dominant forestry paradigm.

For more than 100 years, the dominant paradigm of forestry has been built on the assumption that cutting and removal of trees is necessary. The reasons proclaimed by forestry proponents have changed regularly (e.g., remove decadence, clear land for agriculture, forest health, slow succession, speed succession, fire risk reduction, save endangered species, restore the forest, increase grazing, improve fish habitat), but the action underlying every rationale has always been to cut the trees and sell them. An enormous body of science is produced every year in forestry detailing how to maximally grow and cut profitable trees while maintaining the minimum populations of endangered species or noncommercial tree species required by law. The US Forest Service has a long history of suppressing the science that contradicts its preconceived management actions (Schiff, 1962; Huggard and Gómez, 2001), and even today few papers are published questioning the fundamental assumptions of forestry or forest management.

Our work to protect the native plants and animals that require severely burned forests in the western USA brought us into conflict with the gatekeepers of the forestry paradigm. Our research showing that spotted owls (*Strix occidentalis*: Fig. 2.1A and B) can benefit from forest fires (Bond et al., 2009; Lee et al., 2012; Lee and Bond, 2015; Bond et al., 2016; Lee, 2018) demolished the primary reason given by the US Forest Service to justify lucrative postfire logging and logging in the last remaining stands of old-growth forest—fire risk reduction to save spotted owls. We also publicly criticized the faulty work of academic scientists who considered themselves the only legitimate experts on the topic, and who are funded by the US Forest Service. The gatekeepers responded by vilifying us within

Figure 2.1
(A) California spotted owl inhabiting forests burned by the 2002 McNally Fire, Sequoia National Forest. (B) Monica Bond measures trees in a California spotted owl nest stand that remained active despite having been burned by the McNally Fire. *(A) Photo by Brett Hartl; (B) Photo by Derek Lee.*

the forest science and management communities, smearing our reputations and credibility publicly, attempting to damage our careers and livelihoods, and publishing criticisms of our work while blocking our rebuttals. Our work has saved many trees from the forester's chainsaws and the field of forest ecology is forever changed by our new ideas, but the fight has been asymmetrical and personal instead of a purely scientific disagreement.

One of the tactics used against us by the gatekeepers of the forestry paradigm is to claim that we were "agenda-driven." This term is an attempt to vilify us for something every human does, because all human beings have agendas and motivations of some sort that drive their actions. Our agenda is to ensure the best available science is applied toward land management decisions that influence spotted owl habitat. The agenda of our opponents, who are funded by the US Forest Service, is to support logging spotted owl habitat under the pretense that it might reduce fire severity. In our advocacy, we had urged the government to utilize new science that challenged the dominant paradigm. Our opponents responded by personally attacking us and attempting to discredit our science by questioning our motives. Calling us "agenda-driven" and claiming our advocacy for our data was unprofessional or "outside scientific norms" are classic gatekeeper tactics. In reality, who better than the scientists themselves to present their scientific findings to management agencies in a comment letter or expert declaration? It is a scientist's obligation and duty to stand up for their data. Moreover, providing input on land management projects is a critical public service offered by scientific experts to the government, free-of-charge. Anyone who claims that a scientist who advises the legal process of managing public lands is acting "against norms," is trying to silence the dissident and is out of touch with the hundreds of scientists that routinely do this as exemplified by the chapters in this book (e.g., see Chapter 7, Scientific Integrity and Advocacy: Keeping the Government Honest and Chapter 8, Why Advocate and How?). This is a chilling phenomenon that has no place in an open marketplace of ideas that is not distorted by corruption or unacknowledged biases.

Before you dissent

You might become a dissident scientist accidentally by simply following your own curiosity and moral compass. We believed that we were merely contrarians engaged in a healthy scientific debate about spotted owls and forest fire until our adversaries published an ad hominem smear article defaming us, and their widespread vilification of us and our work within the industry and US Forest Service became known to us. If you have the luxury of knowing you will become a dissident for your ideas, take time to learn about what will likely transpire, and make preparations.

Carefully examine the situation and devise a plan to: (1) publish and publicize your dissenting data and interpretations wherever possible, (2) expose attempts at suppression, and (3) build a social movement to promote your idea. Study the methods of effective social actions and public relations campaigns. Contact experienced activists and public relations experts and obtain their advice or services. Find like-minded scientists and activists and build a community for mutual support.

Ask yourself: who is your opposition and what is their network of support? Who are your current supporters? Who are potential supporters? What actions can be taken to win greater support or to undercut opposition? What will be the financial costs? How much time will it take? What are the various options? What happens when roadblocks and significant adversity are encountered? What are the options down the track? Does this action contribute to long-term goals? (Martin, 1997).

The pamphlet Courage Without Martyrdom: A Survival Guide for Whistleblowers, published by the Government Accountability Project and the Project on Government Procurement, offers the following advice to would-be whistleblowers and dissidents (also see Chapter 7, Scientific Integrity and Advocacy: Keeping the Government Honest).

- Before taking action, see if there is some way to achieve your goal by working within the system.
- Try to find out if there are other people, especially coworkers, who share your concerns.
- Before taking any action that may lead to an attack on you, consult with family and close friends. You need their support.
- Keep a detailed record of events. When something important happens, write up a statement including witnesses, if possible.
- Make copies of as many of the important documents that you can. Your case may depend on them.
- Find allies among honest supporters including politicians, journalists, and community organizations.
- Develop a plan for taking the initiative; do not just respond to actions by the other side.
- Obtain advice about taking legal action.
- Do not overstate your case.

From interviews with whistleblowers (Martin, 1997):

- Do not trust the system. "The system" here refers to the organizational hierarchy of the workplace and the external agencies for pursuing complaints.
- Be prepared for any conceivable attacks. Many whistleblowers learned a bitter lesson: that when they spoke out, there was almost no limit to what might be done to shut them up.

- Many whistleblowers expected to be listened to openly and treated fairly. Instead, they found they had few allies and were attacked in unexpected ways. This was summed up as: "don't be naive."
- "Document everything." Many whistleblowers wished that they had collected more records and held off speaking out until their documentation was greater.

Other useful hints mentioned by one or more whistleblowers:

- Always be tactful and polite.
- Do not despair in adversity.
- Never give up.
- Timing is crucial.
- Do not blame yourself.
- Publicity is valuable.
- Do what you believe is right in the pursuit of truth, even when the path is difficult and strewn with challenges.

Getting your ideas out

Publish and publicize your ideas whenever and wherever possible. Many of the contests in the marketplace of ideas were won by exposure and repetition. Publishing your idea in a scientific journal or book is not the end of the battle, it is the beginning, but even that can be a challenge. Dissenting scientists should expect more rejections than average and should prepare for an extended cycle of resubmissions. Scientific publishing is a well-known minefield for outsiders and the process is often used to censor challenging ideas (Horrobin, 1990; Alvesson and Sandberg, 2014; Siler et al., 2015).

Perseverance and careful adherence to formatting and other author guidelines for each journal should eventually result in a publication. Rejections can also be refuted via a response to the editor point by point, and it is worth challenging rejections that are weak or unsubstantiated. Contrarian and dissident scientists may have to seek publication outside the high-impact journals, but the open science movement and digital publishing make it easier than ever to publish novel ideas (Bartling and Friesike, 2014; McKiernan et al., 2016; Tennant et al., 2017). Postpublication peer review sites such as PubPeerPublons can also provide an outlet for dissident science when it directly challenges a published article that supports a dominant paradigm. As Justice Hugo Black observed in Associated Press v. United States, the First Amendment "rests on the assumption that the widest possible dissemination of information from diverse and antagonistic sources is essential to the welfare of the public, that a free press is a condition of a free society."

A public relations campaign must accompany any new idea if you hope to gain any traction in the marketplace of ideas. Prepare a number of press releases (https://www.wikihow.com/Write-a-Press-Release) and diverse communications

for social media, blogs, op-ed pieces, etc. Explainer pieces, attention-getting imagery, and short videos should all be included in your public relations arsenal. Cultivate different audiences and constituencies to cast a wide net for proponents to join to your idea. If you are not already a part of a larger community devoted to bringing about the changes your dissenting ideas lead to, join an appropriate group that is sympathetic to your cause. Storytelling and narrative offer clues on how to improve science communication (Dahlstrom, 2014, also see Chapter 10, Out of the Ivory Tower: Campaign-Based Science Messaging for the Public). Stories about science breakthroughs that resonate broadly with the public do so because they stir our imagination and elicit emotion.

In addition to communicating your science, always include a call to action so that receivers can be mobilized to make the paradigmatic social or institutional changes your idea initiates. Create many different calls to action that would appeal to different groups or people with diverse motivations. Weigold's (2001) review of science communication and Montgomery's (2017) guide to communicating science will help orient newcomers to this field. Understanding personality-based marketing will help you craft more effective messaging that appeals to specific personality types (Hajnik, 2014; Moss, 2017).

After the first blow lands

If your idea gains some traction within the marketplace of ideas, expect gatekeepers of the status quo or defenders of any industry threatened by your idea to attempt to smear or discredit you. As Martin (1997) stated, "When dissenters first come under attack, often they have a strong impulse to seek redress through 'proper channels.'" This includes appeal procedures, grievance procedures, writing letters to top management, seeking support from professional bodies, ombudspersons, official tribunals, or the courts. Most people believe that the formal structures in organizations and society can provide justice. Many dissidents and whistleblowers speak out precisely because they believe that if they speak the truth, people will listen and take action. They are shocked when the response is to attack them instead. The belief that someone somewhere is looking out for injustices and can correct them is a dangerous illusion. Sometimes official channels do work. Sometimes it is wise to use them as part of a wider campaign, but it is important to realize their disadvantages, and not to expect any solutions from them. With a campaign, formal channels may not be necessary. Politicians and top administrators can always intervene if the urgency is great enough. A noisy campaign is more likely to trigger the involvement of powerful actors than a case following standard bureaucratic protocol.

Understand that powerful actors opposing your new idea will not hesitate to try and defame you to protect their vested interests. Scientific publishers,

whether private or part of a professional association, have only disincentives to publishing comments critical of any paper they already published and considered to be accurate and "true." Thus they too can act as gatekeepers to ideas that challenge the dominant paradigm, simply out of a desire to maintain the appearance that their previous work was of the highest quality and error-free.

Continuing the fight

Some gatekeepers will be protecting their financial interests when they attempt to suppress a new idea. One effective strategy for dealing with powerful scientists tied to powerful industries and/or agencies is public exposure of these links. Such exposure has occurred in controversies over issues like nuclear power, tobacco and cancer, food additives, and pesticides. When the public was made aware of conflicts of interests in the roles of scientists, the ability of scientific experts to legitimize policies and practices of government and industry was greatly reduced (Martin, 1981).

Other gatekeepers will be fighting to preserve their self-identity which has become entangled with the paradigm they are defending. The way our brains are wired into our self-identity makes it exceptionally difficult for dissonant facts to enter our consciousness (Lord et al., 1979; Tesser, 2000; Kahneman, 2011). Presenting facts that dispute a person's innate beliefs may even cause them to adhere more strongly to their misinformed opinion (Nyhan and Reifler, 2010; Hart and Nisbet, 2012). The arguments during the COVID-19 pandemic about whether masks are essential to reduce coronavirus transmission and spread versus it is a hoax and an infringement on personal rights speaks to the depth and controversy of cognitive dissonance. US government climate change denial is also exemplary of the corruption that can taint decision-makers when they are financially supported by fossil fuel companies.

Lewandowsky et al. (2012) offer seven principles for overcoming cognitive biases:

1. Create a narrative that your idea completes.
2. Counter the misinformation from your opposition.
3. Emphasize the facts you wish to communicate rather than the myths from the other side.
4. Provide an explicit warning before mentioning a myth, to ensure that people are cognitively on guard and less likely to be influenced by the misinformation.
5. Ensure that your material is simple and brief. Use clear language and graphs where appropriate. If the myth is simpler and more compelling than your debunking, it may be cognitively more attractive, and you will risk an overkill backfire effect.
6. Consider whether your content may be threatening to the worldview and values of your audience. If so, you risk a worldview backfire effect, which is

strongest among those with firmly held beliefs. The most receptive people will be those who are not strongly fixed in their views.

7. If you must present evidence that is threatening to the audience's worldview, present your content in a worldview-affirming manner (e.g., by focusing on opportunities and potential benefits rather than risks and threats) and/or by encouraging self-affirmation.

Speaking Truth to Power

There are positive signs of progress in making science more transparent and open, which in turn could help dissolve the power that the gatekeepers and thought collectives wield to suppress contrarian and dissenting scientists that have legitimate and provocative research views to contribute. Many universities and funding entities are calling upon researchers to adhere to open science policies, which include making raw data publicly available. Some science journals are reforming the peer-review process by using either the double-blind method where peer reviewers do not know the authors of a submitted manuscript or a completely public and transparent process where the authors and the peer reviewers are identified and all versions, reviews, and responses are published to provide the historical evolution of the ideas therein (e.g., PeerJ https://peerj.com/). There are also postpublication peer review websites where the ongoing discussions about published studies can be seen, even when the publishers do not provide this service (e.g., Pubpeer https://pubpeer.com/). In a digital publishing age, there can be no excuse for limiting discourse by subjecting comments and replies to a gatekeeping peer-review procedure. These are steps in the right direction. Conservation science in general would greatly benefit from more openness, transparency, and fairness in the scientific publishing process and help to change false and entrenched paradigms and embrace scientific advancement. All science and scientists benefit when dominant paradigms are upheld or taken apart—that is the very nature of science, the search for truth beyond reasonable doubt.

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